

CLAIMS

1. A method of manufacturing a crystallized semiconductor device comprising the steps of:

- (i) forming a semiconductor layer on a substrate;
- (ii) irradiating the semiconductor layer with laser light so as to crystallize the semiconductor layer; and
- (iii) forming a thermal diffusion layer on a surface of the semiconductor layer, the thermal diffusion layer having higher thermal conductivity than thermal conductivity of the substrate,

in the step (ii), the semiconductor layer being irradiated with the laser light from above the thermal diffusion layer.

2. The method as set forth in claim 1, further comprising the step of eliminating the thermal diffusion layer after the step (ii).

3. The method as set forth in claim 2, wherein the thermal diffusion layer has lower optical absorptivity with respect to the laser light than optical absorptivity of the semiconductor layer.

4. The method as set forth in claim 1, wherein the laser light having a wavelength of 550 nm or less is used

in the step (ii).

5. The method as set forth in claim 4, wherein the laser light having the wavelength of 350 nm or more is used in the step (ii).

6. The method as set forth in claim 5, wherein the laser light is visible light.

7. The method as set forth in claim 1, further comprising the step of forming a low thermal conductivity layer which is formed between the substrate and the semiconductor layer and has lower thermal conductivity than the thermal conductivity of the substrate.

8. The method as set forth in claim 1, wherein an optical transmittance of the thermal diffusion layer with respect to the laser light is 70 % or more.

9. The method as set forth in claim 1, wherein the thermal diffusion layer is made of silicon nitride, aluminum nitride, silicon oxide, or aluminum oxide.

10. A crystallized semiconductor device manufactured by the method as set forth in any one of

claims 1 to 9.

11. A crystallization apparatus for crystallizing a semiconductor layer, the crystallization apparatus comprising a crystallization means for irradiating a semiconductor device with laser light so as to crystallize the semiconductor layer, the semiconductor device having a thermal diffusion layer on a surface of the semiconductor layer provided on a substrate, the thermal diffusion layer having higher thermal conductivity than thermal conductivity of the substrate,

the crystallization means having a laser light source capable of emitting the laser light having a wavelength of 550 nm or less.

12. The crystallization apparatus as set forth in claim 11, wherein the wavelength of the laser light emitted from the laser light source is so determined that the thermal diffusion layer has lower optical absorptivity with respect to the laser light than optical absorptivity of the semiconductor layer.

13. The crystallization apparatus as set forth in claim 11, wherein the laser light emitted from the laser light source has the wavelength of 350 nm or more.

14. The crystallization apparatus as set forth in claim 11, wherein the laser light source is an excimer laser.

15. The crystallization apparatus as set forth in claim 11, wherein the laser light source is a solid-state laser.